THE

HORSE GELDER'S GUIDE;

CONTAINING AN

ANATOMICAL DESCRIPTION OF THE GENITALS IMPLICATED IN THE OPERATION OF CASTRATION,

WITH

DIRECTIONS FOR CASTING AND CONFINING HORSES

PREPARATORY TO OPERATING.

ALSO:

A DESCRIPTION OF THE PROPER METHOD OF PEFORMING THE OPERATION OF CASTRATION ON STALLIONS, CRYPTORCHID OR RIDGLING AND RUPTURED HORSES.

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PREFACE.

Among the modern Veterinary works published in our own country, that there should not have been, as yet, a word written on the castration of Cryptorchid horses, will not appear altogether so surprising when we come to consider the fact that the operation of castration has seldom, until very recently, been made a special study by well read or scientific men, but has been left to the farmers or common farriers who, as a rule, read nothing and know nothing but the little that their fathers and grandfathers may have shown or told them, and held by each as wonderful and valuable secrets. But the enterprise of the past few years has been making startling inroads on old fogyism. The spirit of progression, and the desire for knowledge based upon scientific and demonstrable facts, has grown to be almost a mania with the American people. A quarter of a century ago the only requisite necessary to become a popular horse gelder was to be able to know when the sign was right; but the time has come when it is required that even horse cutters should have a scientific knowledge of their calling. There never was a period in the history of the United States when the services of educated Veterinary Surgeons were so much needed as at the present time. The importance, therefore, of educating men for Zoolasis, and of furnishing reliable works for study, is self-evident; and this necessity is further illustrated in the daily experience of those persons who, as a matter of necessity, are obliged to do the best they can, having no knowledge of those advantages which a thorough course of training affords. Such persons must necessarily feel that they are groping in darkness, and when a ray of light does flit across their path, it only serves to make them better acquainted with their own lack of skill, and they will certainly hail as a great boon every effort to improve our Veterinary literature, and thus diffuse knowledge so sadly needed. The present work is intended to supply a want, or to fill up a gap, as it were, in our present Veterinary literature, no other writer ever having attempted to delineate the principles of gelding horses that retain the testicle within the abdomen. The aim of this work is to render a full, and at the same time concise, exposition of the anatomy of the scrotum, inguinal canal, testicles and spermatic cords of the horse, these being the parts immediately implicated in the operation of castration, together with a concise description of every detail connected with the operation of castration, as performed by the author.

INTRODUCTION.

A Treatise which professes to embrace the most important of the various matters that fall under the notice of the Veterinarian in the operation of castration, seems to require almost, as a matter of course, some introductory account of the anatomy of the parts implicated in the operation. It would be foreign to my purpose, however, to describe all the details of structure which may be found in anatomical text books, and I have to speak of anatomy chiefly in a surgical sense, or as it bears upon questions which constantly arise in practice. Some topics of this kind will be most appropriately discussed when I come to write of particular conditions and operations; but there are others which may be regarded as prefatory, and to which, when they have once been dealt with, reference need not again be made. We consider a surgeon who is unacquainted with the anatomy of the parts upon which he operates, precisely in the situation of a mechanic who undertakes to repair a broken machine without any acquaintance with its mechanism or operations. Both may possibly do good, but there is always much to be feared that they may work some irreparable mischief. It is true that empirics have made some discoveries no less valuable than wonderful, without even understanding the cause of results acquired by their experiments. Could we, however, but set against these discoveries, brilliant as some of them may have turned out to be, a true catalogue of the failures attendant upon the experiments in which they had their origin, we are sorely afraid the picture would exhibit a complexion which the discoverers themselves could not regard with much satisfaction.

ARTICLE I.

ANATOMY OF THE GENITALS IMPLICATED IN THE OPERATION OF CASTRATION.

The testicles are the truly essential organs of procreation in the male species. They are the two oval glanular bodies suspended from the hollow between the thighs within a case or bag, denominated the scrotum. The scrotum is mainly constituted of a loose skin, which is laterally a continuance of that covering the flanks and thighs, in front with the sheath, and behind with the perinium. In the center of the scrotum is a longitudinal crease called the

raphe. This crease denotes the line of attachment of the septum scroti. On cutting through the integuments of the scrotum we expose a pale yellowish fibrous layer of substance, which anatomists call the dartos muscle—this substance loosely adheres to the skin by cellular membrane, and is still more loosely connected by the same tissue to the tunica vaginalis, the first covering of the testicle. The tunica vaginalis is a production of peritoneum formed into a loose vagina or sheath, which originates at the internal ring. It proceeds with and loosely envelopes the cord, and lastly in the same loose manner covers the testicle and epididymis, to which latter we find it firmly attached, but not terminated, for here it becomes reflected, first upon the epididymis, then on the testicle, and lastly upon the cord, so as to give them all a second covering, closely adhering to the parts it invests. The vaginal cavity possesses a smooth, polished surface, which is constantly lubricated with a serous fluid, which in the operation of castration spirts out the moment that the knife penetrates the tunica vaginalis. An abnormal accumulation of this fluid constitutes the affection called hydrocele. Coming now to the testicles and their appendages, the epididymese, their general form is that of an oval flattened laterally, and about the size of a goose egg. Percival, quoting from M. Girard, says: "That the left is a little larger and more pendant than the right." This, however, does not correspond with my observation and experience, for in this country we almost always find the reverse of Girard's statement to be the case; and in my experience in gelding cryptorchids, I find four out of every five, at least, retain the left testicle within the abdomen. The testicle is suspended within the scrotum by the spermatic chord, which is composed of the spermatic artery, and its corresponding veins, numerous nerves and absorbant vessels, and the vas deferens, which is a continuation of the convolutions of the epididymis, and is the conduit of the semen. The spermatic arteries, right and left, spring, in some horses, directly from the posterior aorta, and in others are a branch from the posterior mesentric artery. The spermatic vein ascends from the testicle along side of its corresponding artery, and empties its blood into the under side of the posterior vena cave. The difference of origin of the spermatic arteries in different horses accounts for the different results of castration by drawing the cords. I will further allude to this mode of castration in a subsequent article.

ARTICLE II.

CASTING AND CONFINING.

I am aware that many good horsemen have an aversion to casting a horse, and that some gelders operate very well, on ordinary cases, using no other means of confinement than the nose twitch. However, a number of serious accidents have happened within my

knowledge, both to operators and animals, by unwarrantable carelessness in this direction, and I would advise my readers never to attempt the operation of castration on horse or colt, no matter how plain the case may be, until the animal is cast and properly confined. Almost every operator has his own favorite way of throwing and tieing his subjects for operation, each of which have their own peculiar advantages and disadvantages. I have tried many different ways, and I think the method which I have been using for the last four or five years, and which I will here proceed to describe, will perhaps present more real advantages, and fewer disadvantages, than any other. My harness is composed of a surcingle, breast collar and crupper. The surcingle is in two parts; the back band or saddle is four inches wide and eighteen long, of heavy harness leather, doubled and stitched; a square of solid wrought iron, three-eighths of an inch thick at each end of the back band, is for fastening sinch straps to. About five inches from the center of the back band, on each side, is two strong wrought iron rings in an iron clevis, which is riveted around the saddle. The belly band is the same length and width as the saddle, with the same sized iron squares at each end. In the center, and four inches to each side of the center, is an iron D, fastened stationary with rivets. The saddle and belly band are united by two strong sinch straps on each side, which are to be laced so as to bring the saddle and belly band exactly to their place, the rings on the saddle exactly opposite each other on the back, and the D rings on the belly band exactly under the chest. The breast collar is then fastened to the front of the iron squares of the saddle. The billets to which the crupper is buckled are attached to a large iron ring which is placed over the horse's coupling, and held to its place by a strong strap on either side, running from the ring to the iron squares on the belly band. When the horse is properly harnessed, each strap should be perfectly tight, and in exactly the same position on each side of the horse. To each of the front feet and to the left hind foot is to be fastened a strong leather hobble with a large D ring in each; to the D in the hind foot hobble is to be tied a rope, the other end of which is to be tied to one of the rings on the back band so as to bring the foot a little forward of the other one, but not so short as to raise the foot from the ground. A strong rope sixteen feet long is then tied to the D on the right side of the belly band, then taken down through the D of the right foot hobble, then up through the center D on the belly band, down again and through the D of the left foot hobble, and finally up through the near side D of the belly band. The horse being now ready to cast, draw the head around to the right side by bringing the halter strap through the front ring on the off side of the saddle, then pull stoutly on the rope running through the front foot hobbles, at the same time push the horse a little, so as to throw his weight on to the off side foot, and allow the near foot to be drawn up to the elbow. When the near foot is

drawn well up, pull stoutly on both rope and halter strap, and the horse will lie down as easy as he would lie down to rest in the pasture; then fasten the rope so that the horse cannot extend the front feet, and by keeping the head drawn to the side, it is impossible for him to rise; then to secure the horse for the purpose of castrating him, the hind feet are to be fastened with strong ropes to the rings on each side of the saddle, but only drawn up to the stifle; a rope is then fastened to the upper hind foot, brought across the coupling and through an iron loop on the big ring that rests on the horse's coupling, then over the hip and between the thighs, drawn tight and fastened to the same foot; turn the horse over and tie the other foot the same way; this prevents the horse from shoving the hind feet forward. Another rope is then to be tied to the under foot, drawn under the horse, and taken through the loop on the coupling, drawn tight and fastened to the upper foot; this brings the hind feet close up to the stiffles, leaving the thighs spread apart so that the inguinal ring can readily be felt through the skin. I believe this to be the safest way a horse can be tied. The rope across the coupling is a support to the back, and the feet being drawn up tight, prevents the animal from struggling. But, notwithstanding all the precautions that care and prudence may suggest, there will occasionally accidents happen to animals, both in casting and by struggling while undergoing operations.

FRACTURES OF THE PELVIS.

The most common accident horses meet with in falling, is fracture of the pelvic bones, which may occur in seven different locations. A fracture through the acetabulam is the only fracture of the pelvis that is incurable. In a fracture through the acetabulam the injured limb seems to be shorter than the other, the foot is turned in, and the toe rests on the coronet of the opposite foot, and the animal is unable to bear any weight on the injured limb. Where the above symptoms are present, no time should be lost in putting the suffering animal out of his misery. The curable fractures of the pelvis are to be recognized by a flatness of the hip and a variable degree of lameness. Such accidents are to be treated by long continued rest in the stable, judicious feeding, and the administration of mild aperients.

BROKEN BACK.

Fractures of the spine occur while the animal is on the ground and struggling from the pain of the operation or from the inconvenience of his position.

Fracture of a vertebra may or may not be accompanied with displacement — the ligaments in some cases holding the bones in their proper place. When there is displacement and pressure on

the spinal cord, there will be total paralysis of the posterior extremeties. In such cases no treatment can be of any avail. When a horse breaks his back while confined for an operation, the operator is apprized of the accident by hearing a dull report within the animal's body like the breaking of a rope. This noise is peculiar, and when once heard, can never be mistaken. When this report is heard the horse should be immediately released from his bonds and assisted to his feet. In some cases there will be no symptoms of lameness or weakness of the hind legs, the bones being held to their place by their ligaments. In other cases there will be partial paralysis of the hinder limbs, with knuckling over at the fetlocks when standing, and when moving the gate is rolling and unsteady, and there is plaiting or crossing of the legs. A case of this kind may generally be cured by putting the animal into comfortable quarters, and in a position where he cannot lie down or move about, and be kept quiet for two or three weeks.

About the first of October, 1881, I castrated a colt for a Mr. Hartsock, living about ten miles southwest of Iowa City. When I was taking off the last nut with the ecrasure, I heard the characteristic report, and on releasing the colt from the hobbles, he made an attempt to rise, but fell over again on his side, and lay for a time apparently unable to move. Having sufficient help at hand we lifted the colt to his feet, and by supporting him we succeeded in getting him into the stable, where we tied him so that he could not lie down or move about, and after giving directions as to the care and treatment necessary, I left him in charge of the owner. The colt swelled very badly from standing still, as all colts will do after castration, if not exercised, but finally made a good recovery.

When a horse has a broken back, it will not do to put him in slings, for the reason that as soon as he feels the support, he will allow his weight to rest in the slings, which will throw his back in an arched position, which is sure to misplace the fractured bones, and cause pressure on the spinal cord.

ARTICLE III.

CASTRATION.

When the testicles have descended into the scrotum, and no complications, such as rupture, exist, the operation of castration is a very simple one, and has been successfully performed in a variety of ways. The characteristic differences of these various methods I need not describe, as I consider the most humane way to be the best of all ways, and that is by the chain or bar ecrasure and screw clamp, and is performed as follows: After casting and confining the animal in the manner described in the preceding article, the operator grasps the testicles, one at a time, tightly in the hand, so

as to draw the skin tight, when a longitudinal incision over each one brings them to view. The epididymis is then to be cut loose from the tunica vaginalis, and the ecrasure fastened on the cord at the proper place, neither too high up or too low down; then the screw clamp is to be put on above the chain or bar of the ecrasure, and the screw set as tight as possible; the ecrasure is then to be screwed up until the cord is separated; the clamp is then taken off and the cord allowed to go back into the scrotum; in this way there is little or no hemorrhage. When, however, the ecrasure is used alone, the bleeding is sometimes alarming. The operation by ligature of the artery seems the most surgical and humane, but experience has proven it to be the very worst, if we except that of drawing the cord out, as is practiced by some of the horse raisers of Colorada and Texas. I have known of several colts operated upon in the last mentioned way dying within a few minutes after the operation from internal hemorrhage.

CASTRATING CRYPTORCHIDS.

In those horses retaining one or both testicles within the abdomen or groin, we find the testicle in three different locations, and in five different conditions, each of which we will describe in their regular turn as we proceed to describe the operation by which the testicle in each location and condition is to be obtained. To geld a cryptorchid or ridgling, as such horses are commonly called, it is necessary to have the horse cast and securely confined in the manner I have already described in the section devoted to that subject. When the horse is properly tied, he is to be placed with the side that is to be operated upon uppermost, and the operator either kneeling or seated behind the horse, proceeds as follows: Supposing the hidden nut to be in the left side, as is generally the case, the horse is laid on the right side; the operator then grasps the upper side of the sheath at the point with the left hand, and pulls the skin forward so as draw it tight, then, with the knife in the right hand, make an incision through the skin and dartos only, beginning about four inches from the point of the sheath and running back about five inches, being very careful not to cut more than barely through the skin and dartos, as there are a number of large blood-vessels on the side of the sheath and in the groin, an incision into any one of which might cause fatal hemorrhage. When the incision has been made of a proper size, the operator lays down the knife, pulls the cut open with the right hand, while the left hand is pushed into the cut and on towards the inguinal ring. In some cases the testicle will be found on the outside of the ring, enclosed in the tunica vaginalis. The nut is about one-fourth to one-half the natural size. When found, it is to be grasped with a pair of forceps and drawn down in sight, so that the tunic can be opened with the knife and the testicle exposed; then cut the epididymis loose from

the tunic; then fasten the ecrasure on the cord above the epididymis; then the screw clamp above the ecrasure; then screw up the ecrasure until the cord is separated; then take off the clamp, and the operation is finished. I call the above described class of horses number one. In the next class, or number two, only the cord is to be found on the outside of the ring, enclosed in a rudimentary tunic, while the testicle is retained inside of the abdomen. In this case the cord is to be drawn down by the forceps, the tunic opened with the knife and cut loose from the cord; then pull gently on the cord, and generally the nut will slip out. But occasionaly the ring is too small to allow the nut to be drawn through without first being dilated. Dilatation of the ring is to be performed as follows: Pour into the opening about an ounce of fine olive oil; then insert into the ring, first, the index finger of the left hand; then the second finger, and then by spreading the fingers apart and turning them around, the ring is soon stretched so as to allow the passage of the testicle; then grasp the cord between the thumb and the palm of the hand, and as the fingers are withdrawn, the nut will follow them out, when the cord is to be crushed with the screw clamp and divided with the ecrasure, as before described. By this method of procedure, there is no laceration of the inguinal ring, and no hernia need be apprehended, as the ring readily contracts to its normal size. In the next class, which I shall here call number three, neither testicle or cord have came through the ring. How then are we to get hold of the cord without putting the hand into the horse's abdomen to search for it? This is what has always puzzled the horse cutters, and caused the death of many a good horse. To geld a number three ridgling, proceed as on the number two, passing the hand up the channel to the inguinal ring, which will be found closed with a thin membrane, the peritoneum, which is easily broken through with the finger. Supposing it to be on the left side, the index finger of the left hand is to be carefully worked through, and then the second finger is also to be passed into the ring, then the fingers are to be spread apart and worked around so as to dilate the ring to its utmost, being careful, however, not to lacerate the ring itself—only the membrane obstructing it—for when the fibers that form the ring are broken, there is no telling to what extent the rupture might be carried, and hernia would very likely ensue, the bowels protruding in volume, which is always a very serious affair to manage and too often terminates fatally. The ring being sufficiently dilated to allow of the free motion of the two fingers, the operator is to feel around in all directions for the cord, which is readily distinguished from other abdominal viscera by its peculiar hard cordy feel. When the cord is found, it is to be grasped between the fingers and drawn out. If the nut does not readily follow, the operator should pour into the opening an ounce or two of olive oil, and gently tug at the cord, working the oil into the ring, so as to lubricate the parts.

When this is properly done, the nut, if of normal size, will soon slip out, when it is to be separated from the cord and the horse allowed to rise. The only after treatment necessary is to keep the wound in the skin open until the internal parts have healed.

The great majority of cryptorchids will be found as already described, but there are a number of abnormal conditions to be encountered by the operator who does any great amount of ridgling gelding. These conditions are: First, atrophy of the testicle, in some cases nothing but the epididymis remaining. Second, hypertrophy of the testicle, in some instance the bulk amounting to that of a man's head. Third, hypertrophy and ossification, and in two instances I have found hair in the tumor. Fourth, a cyst attached to the testicle containing a large amount of fluid, of a yellow or straw color. Fifth, adhesion of the testicle to the peritoneum and omentum.

With regard to the first abnormal condition mentioned, that of atrophy, but little need be said, the operation in these cases being the same as on a number three ridgling, dividing the cord above the epididymis, or pride ball as it is sometimes called. The second condition, that of hypertrophy, is, however, a serious affair to deal with, very difficult to operate upon, and if not properly managed very dangerous to the animal. In all cases when the ring has been opened and dilated properly, as has been described on a preceding page, and traction on the cord fails to bring the testicle to view, a tumor may be suspected to exist. The operator should then pass the index finger of the left hand (supposing still that it is on the left side of the horse that he is operating) into the ring, at the same time pulling at the cord with the other hand, so as to bring the nut against the ring, in which position the operator can readily feel whether the tumor is hard or soft. If it is hard and unyielding to the touch, the operator has no other resource but to dilate the ring by incision. This is readily done by taking a probe pointed bistoury in the left hand, with the back placed against the face of the forefinger, then pass the finger and bistoury into the ring, and with a gentle sawing motion cut through the circular band of muscle which forms the ring. When this is done, the tumor can be easily drawn through, no matter how large it may be. The cord is then to be divided in the proper manner, and a large towel pushed up, fold by fold, into the cut, and the horse allowed to rise. After giving an injection to clear the rectum of feces, and watching the horse until he urinates, the towel is to be carefully taken out. By this means the bowels are kept to their place, whereas if the horse were allowed to rise without first putting the towel into the cut, the bowels would most likely come down in volume; or if the towel were taken out too soon, the horse in straining to stale or dung might strain the bowels out, which is always a troublesome and dangerous complication. (This accident will be treated of in section on Hernia.) If the tumor on examination has a soft fluctu-

ating feel, a large trocar is to be pushed into it and the fluid drawn off. This fluid in some cases amounts to a quart or more. The empty cyst is then easily drawn out through the ring without enlarging it by cutting. If the testicle adheres to the inside of the ring, the operator must use his finger nails to detach it. While pulling gently on the cord, work the finger nails under and around the nut until its adhesions give way, when the nut may be drawn out and taken off in the usual manner.

Though I have already mentioned in outline the different characteristics of the proper method of operating in each particular case or condition, yet it may render these characteristics more definite if I relate in detail the history of one or two particular cases of each kind as they come along in my practice.

ILLUSTRATIVE CASES.

In July, 1880, I was called to the farm of a Mr. Wm. Harding, a few miles from Keithsburg, Illinois, to castrate a seven year old horse, that showed but one stone in the scrotum. After casting and confining the horse in a proper position—it being the left testicle that was missing from the scrotum—I made an incision in the left side of the sheath about five inches long, starting the knife about four inches from the point of the sheath, and running back in a direct parallel with the raphe; I then pulled up the upper part of the incised skin and pushed my left hand up the channel to the inguinal ring, which I found closed with peritoneum, (there being no tunica vaginalis in horses retaining both nut and cord within the abdomen); I pushed the index finger into the ring, and with the nail scratched through the peritoneum, then passed in the second finger, and then by spreading the two fingers apart, and turning them around as much as possible, I soon had the ring dilated so as to feel no pressure on my fingers when placed together, I then moved my fingers around in all directions until I found the cord, which I grasped between my fingers and drew it out through the ring, but the testicle did not follow as it should do in ordinary cases. After tugging at the cord for a few moments, I again inserted my finger into the ring, when by pulling on the cord with the other hand, I could plainly feel a large tumor, as hard as bone. Not having a probe pointed bistoury at hand at the time, I laid the back of the blade of a small pocket knife on the face of the fore finger of my left hand, holding the handle lightly between the thumb and second finger; I then passed my finger with the knife blade into the ring, and by a sawing motion cut through the sphincter of the ring; I then withdrew the knife and again applied traction to the cord; just at this juncture the horse gave a violent struggle, and out popped the nut, as large as a man's two fists. After taking off the nut I pushed a large handkerchief into the cut, took out the other nut, untied the horse and let him rise. After

watching him until he had dunged and staled, I drew the handkerchief out; the horse was quite stiff and sore for a few days, but made a speedy recovery, and was shortly afterwards sold for a large price.

In July, 1879, I castrated a horse for a Mr. Josiah Thompson, living a few miles from Monmouth, Illinois. After drawing down the cord in the usual manner, and pulling at it for a few moments without being able to draw down the testicle, I felt in with my fingers and found a large soft fluctuating tumor, which I drew down by the cord against the ring and punctured it with a trocar and canula. After drawing out the cutting instrument there was a gush of straw colored fluid through the tube. About two and a half pints of this fluid escaped, when the testicle and cyst were easily drawn out without enlarging the ring by cutting; this horse also made a good recovery in a very short time.

In June, 1876, I castrated a horse for W. H. Hankins, then living a few miles south of Sigourney, Iowa. After finding the cord in this case and drawing on it a few seconds with no result, I inserted my two fingers through the ring and again pulled at the cord, the traction on the cord tilted the nut up against my fingers, and on examination I found it adherent to the inside of the ring; I worked it loose with my finger nails and drew it out, bringing along with it about fifteen inches of the omentum, which I took away along with the testicle. I drove this horse myself through the country about my business for ten days, and returned him almost entirely well; and here let me add, that ordinary work or driving is in all cases beneficial; in fact I have never known a horse to do poorly that was worked every day after castration.

ARTICLE IV.

HERNIA, AND ITS TREATMENT.

Hernia is named according to its situation. A rupture at the navel is called umbilical Hernia; a slight protrusion of intestines through the inguinal ring, is called an inguinal Hernia. When the protruded gut reaches the scrotum, it is called scrotal Hernia. A protrusion of intestine through a rupture of any part of the parietese of the abdomen, except at the navel, is called a ventral Hernia.

A Hernia is reducible when the protruded gut can be easily put back into the abdomen, and irreducible when it is not strangulated, but yet cannot be returned into the abdomen. A Hernia is said to be strangulated when the contents of the sack are not only irreducible, but are so compressed as to impede circulation. This condition soon causes pain and inflammation, and if not speedily relieved by a surgical operation, terminates fatally in a few hours.

The form of Hernia with which horse cutters most commonly meet, is reducible scrotal Hernia. When called upon to castrate a bursten, the operator should provide himself with a pair of clamps, about six or eight inches long, and about double as heavy as those ordinarily used for clamping the cord in the old method of castrating. After casting and securely confining the horse, he should be placed with the ruptured side uppermost. The operator then makes an incision through the skin and dartos only; then dissect the tunica vaginalis from the cremaster muscle as high up as possible; then work the intestine into the abdomen, holding the testicle down to the bottom of the scrotum. When the intestine has been carefully worked back into the abdomen, place the clamp around the cord and tunic as high up as it can be got and tie it securely, and it is well to further secure the clamp in place by passing a stitch through the tunic at each end of the clamp and tieing the threads around the clamp; then open the tunic and take away the testicle with the ecrasure. The clamp is not to be taken off, but allowed to slough away with the parts it incloses. Congenital scrotal hernia is very common in foals of the large, coarse breeds, and colts in this condition usually thrive poorly. I castrated a number of foals in this condition during the season of 1881, all of which did well and throve better after the operation than before. Many foals have congenital umbilical hernia, and thrive poorly in consequence. The operation which I have adopted for closing an open navel is very simple in application, and has proven to be eminently successful. It is performed as follows: After casting and properly confining the colt, it should be placed on its back, in which position the bowel is easily returned into the abdomen. After the reduction has been effected, two hickory skewers are passed through the skin and abdominal muscles, one at each extremity of the opening; the skewers are united by wrapping a strong cord around their ends. Care should be taken not to draw this cord so tight that it will stop the circulation in the fold of skin included between the skewers. The objects to be attained are the union of the internal surfaces of the folded skin, and the production of an exudate to block up the hernial opening. This is generally accomplished in about a week, when a second ligature should be applied, tight enough to slough the enlargment away. A ventral hernia is to be treated in the same manner. It is, however, in some cases more difficult to get the skewers to the right place, and for these operations I sometimes chloroform the animal.

CONSEQUENCES OF CASTRATION.

The normal or natural results of castration are a variable degree of swelling and a slight discharge of serum or pus. If the scrotum and sheath swell to an alarming degree, it is necessary to open the cuts on either side with the hand, and to make a few punctures

along the sides of the sheath with a lancet or pocket knife, and the animal should be well exercised; if a work horse, an ordinary day's work will, with the treatment above recommended, usually reduce the parts to their normal size. After castration a horse should never be allowed to stand in the stable more than over night—turning to pasture or putting to work is always to be recommended.

Hernia sometimes occurs after large tumors have been taken from the abdomen, and is to be treated by returning the gut and sewing up the cut. The stitches are to be taken out in twenty-four hours, and the cut well opened up with the hand, all danger of a return of the trouble having passed by this time.

Scirrhus of the cord need never occur after castration with the ecrasure, if proper care is taken to cut the cord high enough up to prevent the end from hanging out of the wound.

Tetanus may result from castration, as it does when caused by any other injury, and cannot be imputed to any fault of the operator.

Inflammation of the peritoneum may occur after castration, and is said to be due to the prevalence of easterly winds, or exposure to cold and wet, or to a constitutional tendency to inflammatory disease.

I have made several post mortem examinations of animals that died from peritonitice after castration, and in every case I have found one or both the cords had drawn up into the abdomen. In three of these cases a ligature had been used in place of clamps, and in two cases the cords had been drawn out and considerable hemorrhage had taken place at the time of operating.

The question has frequently been asked me why it is not as safe to draw the cords from a horse or colt as to draw them from a bull or calf?

By referring to our section on anatomy, it will be seen that in the horse the supply of blood for the testicles is in some cases derived directly from the posterior aorta, and is returned to the posterior vena cavae by a direct conduit from the testicle; while in the bull the spermatic artery is a branch of the external illiac, and the vein of the cord returns its blood into the external illiac vein.

It is evident, therefore, that drawing the cord from a horse may rupture either or both of the main vessels of the hinder part of the body, which could not but prove fatal; while in the same operation on a bull a similar accident would be an impossibility.

In 1875 I knew of eighteen colts being castrated by this method; four of the number died; in 1879, two out of five died in about fifteen hours after the operation, and another one of the same lot

died the fourth day. In 1880 a man by the name of Sheats altered two colts for a Mr. Mickey, living near Morning Sun, Iowa; both colts died from internal hemorrhage within a few minutes after the operation.

Parlysis is noticed by some writers as occurring after castration, but I have never seen it, except in cases where the horse had broke his back or otherwise injured himself by struggling violently while undergoing the operation.

GLOSSARY.

ABDOMEN—The belly.

ADHERENT—Sticking, uniting.

ANATOMY—A knowledge of the structure of different parts of organized bodies.

AORTA—The large arterial trunk arising from the left ventricle of the heart.

ACUTE—A disease having a rapid progress and short duration.

ATROPHY—Wasting or emaciation.

ABNORMAL—Unnatural.

APERIENTS—Medicines which gently open the bowels.

ACETABULUM—The cavity in which is lodged the head of the femur, or whirlbone.

BISTOURY—A small knife.

BURSTEN—Affected with a rupture or hernia.

CREMASTER—A muscle which supports and compresses the testicle.

CYST—A bladder or sack.

CORONET—The top of the hoof.

CONDUIT—A vessel that conveys blood or other fluid.

CONVOLUTION—A winding or twisting.

CELLULAR MEMBRANE—The net work which connects the most of the structures of the body.

CRYPTORCHID—A horse whose testicles have not descended into the scrotum. In the west these horses are called Ridglings.

CANULLA—A hollow tube.

DARTOS—The structure which currogates the scrotum.

DILATE—To widen.

ECRASEUR—An instrument used for dividing the cord in castration.

EPIDIDYMIS—An appendage to the testicle.

EMPIRIC—A practitioner whose skill is the result of mere experiment.

FLUCTUATION—The undulation of a fluid in a cavity.

GROIN—The depressed part of the body between the belly and the thigh.

GENITALS—The parts of an animal which are the immediate instruments of generation.

HERNIA—An unnatural protrusion of viscera.

HEMORRHAGE—A bursting forth of blood.

HYDROCELE—Dropsy of the tunica vaginalis.

HYPERTROPHY—Excessive growth.

INTEGUMENTS—The skin and cellular membrane.

INGUINAL—Belonging to the groin.

ILLIUM—The superior bone of the pelvis.

ILLIAC—Pertaining to the illium.

JUNCTURE—A point of time rendered important by a concurrence of circumstances.

LONGITUDINAL—Running lengthwise.

LIGAMENTS—A strong fibrous substance serving to bind one bone to another.

LACERATED—Torn.

LIGATURE—A thread used to tie arteries, or other parts.

LATERAL—Pertaining to the side.

LUBRICATE—To make smooth or slippery.

MESENTERY—Membrane uniting the intestines.

NORMAL—Natural.

OSSIFICATION—The change of flesh into bone.

OMENTUM—The caul.

PUS—Matter produced by suppuration.

PLETHORA—Excessive fulness.

PERITONEUM—The serous membrane investing the viscerea of the abdomen.

PERITONITIS—Inflammation of the peritoneum.

PELVIS—That part of the trunk bounding the abdomen, supporting a part of the intestines, and the urinary and generative organs.

POST MORTEM—After death.

PERINEUM—The parts between the anus and the generative organs.

PARALLEL—To correspond to.

PARITES—The walls or sides of an object.

RUDIMENTARY—An imperfect organ.

RAPHE—A seam upon the scrotum.

RIDGLING—A male animal, half gelt. Cryptorchid horses are called Ridgling.

SERUM—The fluid portion of the blood.

SCIRRHUS—A hard glandular tumor, often ending in cancer; a disease of the spermatic cord, consequent upon castration.

SEPTUM—A partition or division.

SPERMATIC—Pertaining to the testicle.

SEROUS—Thin, watery, pertaining to serum.

SEMEN—Seed, male sperm.

STIFLE—The joint of a horse, corresponding to the knee of a man.

SPHINCTER—A muscle that contracts or shuts an orifice.

STALE—To discharge urine.

TUMOR—A morbid enlargement.

TETANUS—Lock jaw.

TUNICA VAGINALIS—The sheath of peritoneum that encloses the testicle and spermatic cord.

TRACTION—The act of drawing.

TROCAR—An instrument for tapping a cavity filled with serum or gas.

UMBILICUS—The navel.

VENA CAEVA POSTERIOR—One of the two main trunks of the venous system, receiving the blood from the hinder parts of the body,—one of the largest blood vessels.

VETERINARIAN—One skilled in the diseases of domestic animals.

VAGINA—A sheath.

VASDEFERENS—Excretory duct of the testicle.

VERTEBRA—Bones of the spinal column.

VENTRAL—Belonging to the belly.

ZOOLASIS—The Veterinary art.